

CLAIMS

1. A four-pole synchronous motor comprising: a cylindrical magnet rotor having four magnetic poles, said magnet rotor being supported in a housing and capable of rotating about an output shaft; and a stator, through which the output shaft is pierced, being provided in a space encased by said magnet rotor, said stator having a stator core, on which armature coils are formed with bobbins,

wherein the stator core has first magnetic pole cores formed at both ends of a connection body part of crisscrossed connection body parts and second magnetic pole cores formed at both ends of the connection body part, the first magnetic pole cores include magnetic flux acting surface parts extended toward both sides thereof in a circumferential direction, and a shape of each magnetic flux acting surface part on one side of a longitudinal centerline of the first magnetic pole cores is different from that on the other side so as to be magnetically asymmetrical with respect to the longitudinal centerline.

2. The four-pole synchronous motor according to claim 1, wherein auxiliary cores are provided to both sides of the second magnetic pole cores so as to extend magnetic flux acting surface parts thereof toward both sides in the circumferential direction, and the auxiliary cores are held between the second magnetic pole cores and the bobbins.

3. The four-pole synchronous motor according to claim 1, wherein pole piece sections are provided to both sides of the second magnetic pole cores as auxiliary cores so as to extend magnetic flux acting surface parts thereof toward both sides in the circumferential direction, and a shape of each pole piece section on one side of a longitudinal centerline of the second magnetic pole cores is different from that on the other side so as to be magnetically asymmetrical with respect to the longitudinal centerline.

4. The four-pole synchronous motor according to claim 1, wherein the magnetic flux acting surface parts of the first magnetic pole cores and the second magnetic pole cores, which face said magnet rotor, are formed in the circumferential direction within central angles of 50-70 degrees.

5. A four-pole synchronous motor comprising: a cylindrical magnet rotor having four magnetic poles, said magnet rotor being supported in a housing and capable of rotating about an output shaft; and a stator being provided in a space encased by said magnet rotor, said stator having a stator core, which includes first magnetic pole cores formed at both ends of a connection body part of crisscrossed connection body parts, through which the output shaft is pierced, and second magnetic pole cores formed at both ends of the connection body part and on which armature coils are formed with bobbins,

wherein the bobbins have groove sections, each of which is formed into a U-shape by a cylindrical core section, a wall section enclosing the cylindrical core section and a bridging section connecting the both, the ring-shaped armature coils are fitted in the groove sections, and the second magnetic pole cores are pierced through the cylindrical core sections until the bridging sections contact side faces of the connection body part of the first magnetic pole cores, thereby the bobbins are fitted in the stator core.

6. The four-pole synchronous motor according to claim 5, wherein the ring-shaped armature coils, which are wound by a winding jig, are fitted in the groove sections of the bobbins.

7. The four-pole synchronous motor according to claim 5, wherein the armature coils are formed by winding a self-welding wire, fitted in the groove sections of the bobbins and adhered therein.

8. The four-pole synchronous motor according to claim 5, wherein the cylindrical core sections are outwardly projected from the wall sections, insulator films covering side faces of the armature coils fitted in the cylindrical core sections are fitted to the cylindrical core sections, and connection boards, in which cable patterns for mutually connecting electrodes of the armature coils are formed, are provided on the outer side of the insulator films and fitted to the cylindrical core sections.

9. The four-pole synchronous motor according to claim 5, wherein the bobbins have first wiring holes, through which off-connection wires, which mutually connect connection boards in which cable patterns for mutually connecting electrodes of the armature coils are formed, are pierced, and second wiring holes, through which external wires, which are connected to the connection boards, are bundled and pierced.